DOCUMENT RESUME

ED 208 020 TM 810 709

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TITLE Attributions, Learned Helplessness and Sex Differences in Achievement.
PUB DATE 81
NOTE 16p.; Expanded versions of papers presented at the Annual Meetings of the American Educational Research Association (65th, Los Angeles, CA, April 13-17, 1981), and the Society for Research on Child Development (Boston, MA, 1981).

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Academic Ability; *Academic Achievement; *Attribution Theory; Elementary Secondary Education; *Helplessness; Literature Reviews; *Mathematics Achievement; *Sex Differences

ABSTRACT

An analysis of three issues concerning the possibility that sex differences in causal attributional patterns may be important mediators of sex differences in persistence in one's mathematics education are addressed. These issues include: (1) the exact nature of the sex differences in attributional patterns for school achievement and the consistency of these differences need to be specified; (2) the psychological and causal significance of these differences need to be addressed; and (3) the interpretations commonly given to these differences need to be evaluated. Literature on the subject is reviewed, and conclusions are offered. (Author/GK)

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Attributions, Learned Helplessness and Sex Differences in Achievement

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Expanded version of papers presented at the annual meetings of the Society for Research on Child Development, Boston 1981, and American Educational Research Association, Los Angeles 1981.

TM 810 709

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There has been sufficient discussion in the attributional literature to suggest the possibility that sex differences in causal attributional patterns may be important mediators of sex differences in persistence in one's mathematics education, in particular, as well as in one's school achievement more generally. In assessing this possibility three issues need to be addressed: (a) First, the exact nature of the sex differences in attributional patterns for school achievement and the consistency of these differences need to be specified; (b) Second, the psychological and causal significance of these differences need to be assessed; (c) Finally, the interpretations commonly given to these differences need to be evaluated. This paper represents my analysis on each of these issues. Particular attention will be paid to the domain of mathematics.

Sex differences in attributional patterns

As Fennema has recently pointed out, it is commonly concluded that females and males not only differ in their attributional patterns in systematic ways, but also that this difference has an adverse effect on girls' classroom performance. A careful review of the most commonly cited studies and of a sampling of the most recent studies focusing on the attributionl patterns of school age children has led me to question the validity of these conclusions for boys and girls. I found the effects to be neither as consistent nor as strong as one might expect based on the conclusions one reads in various review chapters (e.g., Bar-Tal, 1978; Deaux, 1976; Frieze, Parsons, Johnson, Ruble, & Zellman, 1978; Ickes & Layden, 1977).

In summarizing the conclusions reached in various review chapters, Fennema (in press) has characterized the sex difference in failure attributions as follows: "Males tend to attribute . . . failures to external or unstable causes. Females tend to attribute . . . failures to internal causes." (Page xx). This conclusion suggests a comparison between boys and girls of their attributions of failure to lack of ability, to lack of effort, to internal and to external causes in general. The pattern of findings for each of these comparisons is equivocal. For example, while some studies report that girls attribute their failures more to lack of ability than do boys (e.g. Dornbusch, 1974; Wolleat, Becker, Pedro & Fennenea, 1980; Nicholls, 1975; Parons, Adler, Kaczala & Meece, in press b; Adler, Futterman, Goff, Kaczala, Meece, in press a), other studies either do not find or do not report sex differences (e.g., Beck, 1977; Diener & Dweck, 1978; Dweck & Reppucci, 1973; Dweck, Davidson, Nelson & Enna, 1978; Parsons, 1978). Still other studies find, as Fennema (in press) found, that the nature of the sex differences varies depending on a variety of related variables such as the child's achievement level (Fennema, in press; Parsons et al, in press b), the point in the task at which the attribution is taken (Nicholls, 1975), the wording of the question (Dweck & Bush, 1976; Parsons et al. in press b) and the sex and age of the evaluator (Dweck & Bush, 1976).

The patterns of results for attributions of failure to both the lack of effort and to internality more generally are equally equivocal. For example, using the I.A.R., Dweck and Reppucci (1973) reported no sex difference in general internality for failure but found boys to be slightly more likely to attribute their failures to lack of effort than girls.

In contrast, Crandall, Katkovsky & Crandall (1965) found girls to be more internal for their failures; Fennema (in press) found an interaction between achievement level and sex in attributions of failure to lack of effort; Beck (1977) found no sex differences in either internality or lack of effort attributions; Diener and Dweck (1978) did not report a significant sex difference on either lack of effort or internality for failure; and Dweck et al. (1978), Fennema (1981), Nicholls (1975), Parsons (1978) and Parsons et al. (in press a,b) found no main effect sex difference in attributions of failure to lack of effort.

Similarly inconsistent patterns emerge for the measures of attributions of failure to external causes. For example, while Nicholls (1975) found that boys were more likely in one of two tests to attribute their failures to bad luck, and Crandall, et al. (1965) found boys to be more external for failure on the I.A.R., other studies have either found no sex difference in the use of external attributions for failure (e.g., Dweck et al. 1978; Parsons, 1978; Parsons et al. in press a,b) or mixed results depending on the particular attribution assessed (Nicholls, 1975; Dweck & Reppucci, 1973) or the evaluator (Dweck & Bush, 1976).

Based on this review, the conclusion that males tend to attribute their failures to external or unstable causes while females tend to attribute their failures to internal causes appears to be a gross oversimplification. The most consistent difference, and the one which is consistent among studies of mathematic's failures in particular, is that females are slightly more likely to attribute their failure to lack of ability than males (Dornbusch, 1974; Fennema, 1981, and Parsons, et al. in press a,b). The evidence regarding more general patterns of

attributing failures to stable, unstable, external or internal causes is equivocal at best.

Assessing the studies listed above for evidence regarding sex differences in attributions for success led me to the following conclusions. (Due to space limitations, I will not discuss the basis of these conclusions in as much detail as the attributions for failure). Given general achievement tasks, there is no consistent sex difference in the degree to which success is attributed to either internal causes or external causes. A finding of no significant difference between the sexes is the most common result. One consistent finding does emerge, however, in studies of focusing on mathematics: boys rate ability as a more important cause of their success and effort as a less important cause than girls (Wolleat et al, 1980; Parsons, et al, in press a,b). Sex differences in external attributions were either non-significant or not reported. Thus, as was the case with failure attributions, the global conclusions found in most review articles are overgeneralized.

Psychological and causal significance of attributional differences

One might be tempted given the fairly consistent sex differences in the use of ability as a causal explanation for both math success and failure to build a model of sex differentiated persistence around this difference. But even these tentative conclusions must be tempered by three additional considerations: the magnitude of the sex difference effect, the importance of the lack of ability attribution relative to the other possible attributions, and the causal significance of this difference in mediating achievement behavior.

The magnitude of the sex difference is generally quite small. For example, in Fennema's study, sex accounts for only 1.4% - 4% of the variance in the attributional ratings, and in my own studies (Parsons, et al. in press b) sex typically accounts for only 3-5% of the variance. Similarly, in studies using the I.A.R. the sexes typically differ by no more than 1 - 1½ items. (Crandall, et al. 1965; Dweck & Reppucci, 1973) and the findings are inconsistent as to the direction of the difference.

My results (Parsons, et al. in press b) highlight the second consideration. We found that the girls rated lack of ability as the fifth while boys rated it the sixth most important cause out of a possible list of 8. In other studies, depending on the methodology used, lack of ability ranges from a miminally important to a moderately important reason for failing relative to other possible causal explanations for both boys and girls. Dornbusch (1974), Dweck & Bush (Study 1, 1976) and Parsons et al., (in press a,b) all found lack of effort to be the most preferred attribution for both boys and girls; Parsons et al., (in press b) found task difficulty to be the second most important reason given for math failures by both boys and girls. Even in studies in which lack of ability is rated as fairly important (e.g., Dweck & Reppucci, 1973; Dweck & Bush, 1976; and Fennema, 1981) it rarely exceeds the importance attached to lack of effort by either boys or girls. Thus, for failure, the sex difference does not occur on the most probable attributional cause and the rated importance of lack of ability is either lower than or no different than the other internal cause; namely, lack of effort.

Turning to the third consideration, the causal significance of the attributional differences, I agree with Fennema (in press) that these differences do not seem very important in predicting long term persistence

in mathematics. In our study (Parsons, 1980) attributions add only about 1 - 2% to the amount of variance in persistence that can be accounted for using a battery of measures which included perceived task value, confidence in one's mathamatical ability and perception of task difficulty. A recent study of Covington and Omelich (1979) provides additional support for my conclusion. Based on the results of a path analysis, they concluded that attributions have little causal significance for on-going classroom achievement behaviors. Thus, one must question models based on attributional differences proposing to explain sex differences in academic achievement behavior until more evidence is available establishing the causal importance of attributions for school achievement.

Values, attributions and learned helplessness.

Before setting aside the issue of the psychological significance of attributions, I want to applaud Fennema for her recent comments on the value judgments being made regarding the significance of the sex difference in attributional patterns. I will go one step further and address some comments to one particular concept that has grown out of the attributional research; namely, learned helplessness. Learned helplessness is currently being used to "help explain sex-related differences in achievement strivings." The assumption that girls are more learned helpless than boys has recently (Dweck & Licht, 1980) been extended to explain, in particular, achievement differences in mathematics. Given the importance that is being attributed to this construct, I felt it critical to evaluate the validity of the assumed sex difference. Learned helplessness has been operationally defined in a variety of ways. I have chosen

to focus my review on the following four: a) attributions of failure to a stable, internal cause, i.e., ability, b) non-attribution of success and failure to effort, c) debilitating behavioral response to failure, and d) teacher nomination.

I found supporting evidence for the assumed sex difference only for the first of these four operational definitions; however, as discussed earlier, both girls and boys also attribute their failures to lack of effort and the sex difference in the children's attributions of failure to lack of ability are generally quite small. With regard to attributing one's successes and failures to effort, the sex differences are inconsistent and just as likely to go counter to the predicted direction as to support it. The one study that used this criteria to classify children as learned helpness or mastery oriented (Diener & Dweck, 1978) did not report finding any sex difference in the attributional patterns or in the percentage of children judged to be learned helpless. Using children's behavioral response to failure as the criterion measure also lends little support to the notion that girls are more learned helpless than boys. While the nature of girls' responses to failure are affected by the sex and age of the evaluator (Dweck & Bush, 1976), girls' behavioral responses in terms of persistence and accuracy following failures are, by and large, equivalent to boys' (e.g., Beck, 1977; Dweck & Reppucci, 1973; Dweck 1975; Dweck & Gilliard, 1975; Diener & Dweck, 1978; Dweck & Bush, 1976; Nicholls, 1975; Parsons, 1978,1980; Parsons et al. in press b). In fact, in a recent study, using a measure of behavioral response to failure that included a drop in both persistence and accuracy as the criterion for classifying children as learned helpless or

mastery oriented, we found that most of the children classified as learned helpless were boys; only four girls out of a sample of 120 children exhibited what we labelled as a learned helpless response to failure feedback on mathematical problems (Parsons et al. in press b). Similar results were reported by Rholes, Blackwell, Jordan and Walter (1980). Again using a behavioral assessment, they found no sex differences in the learned helplessness. These results do not seem surprising to me, given that girls do just as well if not better than boys in their mathematics courses. With regard to the final criterion, teacher nomination, only one study relied on this criterion, namely Dweck (1975); she ended up with a sample of five girls and seven boys.

This is not to say that boys and girls do not differ in their responses to achievement feedback. There is some evidence, though it is also not consistent, that girls' expectancies and affective responses are influenced more negatively by failure. But with regard to learned helplessness per se I can find little support for the conclusion that girls on the average are more likely to exhibit learned helplessness behavior than are boys within either general achievement tasks or mathematics. Cooper, Burger and Good (1981) have reached a similar conclusion in a meta-analytic study of the locus of control literature.

Conclusions

What then can we conclude? In this section I will focus primarily on mathematics. First, there are <u>small</u> sex differences in the attributions made for success and failure in mathematics. While both males and females see both effort and ability as important causes of mathematical achievement,

they differ slightly in the relative importance attached to each of these causes; boys rate mathematical ability to be a more important cause of success and lack of ability as a less important cause of failure than do girls. Second, when forced to compete with other possible causes, attributions in general do not seem to be playing a very significant role in mediating course enrollment. What does play a major role is the perceived value of the courses. Perhaps at the point developmentally when one must choose to elect advanced math courses, variables that have been linked to expectancies are not very salient. The relative value for long term goals of the various options open to the high school students appear to be much more salient. Recent research in the achievement area, especially attributional research, has not assessed the differential impact of expectancies and task value in determining achievement despite the fact that achievement research has its theoretical roots in the expectancy -- value tradition (Weiner, 1972). Recent work assessing the determinants of mathematics course enrollment clearly indicates the importance of a more systematic study of the impact of task value on achievement behavior. As developmental psychologists, we should now explore how it is that tasks come to be valued differently by different children. More specifically, why is it that mathematics is seen as a more useful activity by boys than by girls?

But what of attributions? Are we to concluded that they play little, if any causal role in children's achievement behaviors? I think not. Recent work in my lab suggests that attributions, especially attributions to ability, play a critical role when a child confronts a novel set of tasks for which she/he has not yet formed a stable self-concept of ability

(Parsons, 1980). Developmentally, these results suggest that attributions, may play their most important causal role much earlier than high school when self and task concepts are first emerging. Empirically, these results explain, to some extent, the discrepancy between the laboratory attributional studies, like Dweck (1975), which clearly point to the important of attributions and field studies, like Covington and Omelich (1979), Fennema (1971), Parsons (1980) and Parsons et al. (in press), which fail to find a very significant effect of attributional patterns. Laboratory studies, by and large, investigate the importance of attribution in situations which are familar to the children and for which they have had ample experience on which to base a stable self and task concept. My colleagues and I are currently investigating the role of attributions in the formation of self concept of ability. Initial results based on causal modeling procedures lend support to the hypothesis (Futterman, 1980) that attributions have their most direct causal effect in the formation of one's self concept of ability rather than on more objective measures of achievement behaviors like performance or task choice.

Alternatively, it is also possible that attributional patterns influence the decisions students make regarding various achievement tasks because they influence the students' perceptions of the demands inherent in the tasks to be chosen. Girls do see consistent effort and skill or knowledge as more important determinants of success in mathematics and natural ability as a less important determinant of success than do boys (Parsons et al. in press b). These differences in attributions for success suggest that there are somewhat different perceptions of the causes of success in math among children who have the ability to master advanced level math courses and to seek out math related careers. These differences may have their most marked effect on the children's perceptions of the task demands inherent in future,

more advanced math courses, rather than on the children's responses to experiences in their current math courses. The girl who views consistent effort (or skill and knowledge generally adquired through consistent effort) as a more important determinant of success in mathematics than ability might have lower expectancies for her future success precisely because future courses are considered even more difficult, demanding even more effort to continue to succeed. The amount of effort a student can or is willing to expend has limits and if a student already thinks she is working very hard to do well in math, she might conclude either (a) that her performance will deteriorate in these more difficult math courses because she is trying as hard as she can at present or (b) that the amount of effort necessary to continue performing well is just not worth it. For some students either of these beliefs would be sufficient justification for a decision not to enroll in advanced math courses. The same limits would not apply to a boy who views his ability rather than his efforts as the relatively more important determinant of his success in math. His abilities should allow him to continue performing well with little or no additional expenditure of effort. In support of this hypothesis, girls do have lower future expectancies and see future math courses as more difficult than the boys (Parsons et al. in press a), but do not have lower expectancies for success on either their current math course or in the experimental mathematical task. (Parsons et al. in press b). In addition, Parsons et al. (in press b) has found that the girls are less likely than boys to exhibit a learned helplessness response to an induced experience of mathematical failure.

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